



## THE IMPORTANCE OF NEW INNOVATIVE TECHNOLOGY IN STUDYING THE STRUCTURE OF THE HEART AND TEAMS

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*Heart, blood, transport, organ,  
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### ABSTRACT

*The article provides information about the structure, function and importance of the blood vessels in the blood circulation system - heart, aorta, artery, vein, capillary blood vessels and their importance in human life.*

Blood circulation provides all metabolic processes in the human body and therefore is a component of various functional systems that determine homeostasis. Carrying out one of the main functions - transport - the cardiovascular system ensures the rhythmic flow of physiological and biochemical processes in the human body. All the necessary substances (proteins, carbohydrates, oxygen, vitamins, mineral salts) are delivered to the tissues and organs through the blood vessels, and metabolic products and carbon dioxide are removed. The cardiovascular system performs regulatory and protective functions and, in collaboration with the nervous and humoral systems, plays an important role in ensuring the integrity of the body.

***The purpose of the lesson:*** To study the structure and work of the heart, the features of the structure of the blood vessels and the blood flow in the systemic and pulmonary circulation.

### ***Lesson objectives:***

***Educational.*** Consider the structure of the heart and blood vessels; study the pattern of blood flow in the systemic and pulmonary circulation; to form in students new anatomical and physiological concepts of the cardiac cycle and automatism of the heart; reveal the biological significance of changes in blood composition during its passage through the systemic and pulmonary circulation.

***Developing:*** Development in students of general biological concepts about the relationship between the structure and functions of the heart and blood vessels;

- implementation of the practical application of existing knowledge, skills and abilities (work with tables, reference materials);
- development of students' cognitive interest in subjects of the natural cycle, development of mental operations of analysis, synthesis;
- formation of reflective qualities (introspection, self-correction); development of communication skills.



**Educational:** Expansion of the scientific worldview; education of respect for one's health.

**Lesson type:** combined.

Forms and methods of teaching: verbal, visual, partially search.

Introduced concepts and terms: heart, epicardium, myocardium, endocardium, pericardium, atrium, ventricles, bicuspid, tricuspid, semilunar valves, automatism, excitability, conduction, contractility, minute blood volume, systolic blood volume, cardiac cycle, systole, diastole.

Equipment and materials: Demountable heart model; tables depicting the structure of the heart, cardiac cycle, circulatory circles, PC, presentation "Structure and work of the heart."

Lesson plan:

I. Organizational moment.

II. Actualization of basic knowledge and motivation of students' learning activities.

1. Students perform test tasks in order to check the assimilation of the material covered (by cards).

2. Mutual verification of the task

3. Conversation with students in the form of "Brainstorming"

4. Students' reports about the history of studying the structure of the heart and the laws of blood circulation.

III. Learning new material. 1. The structure of the heart.

2. Blood vessels of the heart.

3. The work of the heart.

4. Types of blood vessels.

5. Circles of blood circulation.

IV. Summing up the results of the lesson and control of students' knowledge.

V. Homework

### **The main indicators of the activity of the heart**

The function of the heart is reservoir and pumping: during the period of relaxation of the heart muscle, another portion of blood accumulates in it, and during contraction, part of this blood is ejected into the large and small circles of blood circulation. Contraction of the heart muscle is called systole, relaxation is called diastole.

For a minute in an adult, an average of 4.5–5.0 liters of blood is ejected from each ventricle. This indicator is called the "minute volume of blood circulation" or "minute volume of blood" (MOV). Based on the surface area per minute, the adult human heart ejects about 3 l / m<sup>2</sup> of blood into each circle. This indicator is called the "cardiac cycle". On average, over 70 years of life, the heart makes about 2600 million contractions, pumping about 155 million liters of blood.

The heart of a healthy person contracts rhythmically at rest with a frequency of 60-70 beats per minute. The period, which includes one contraction and subsequent relaxation, constitutes the cardiac cycle. A complete cardiac cycle lasts 0.8–0.85 s.

The most important characteristic of the performance of the heart is the systolic volume.

Blood pressure is the pressure of blood in the large arteries of a person. There are two indicators of blood pressure:



✓ systolic (upper) blood pressure (BP) is the level of blood pressure at the moment of maximum contraction of the heart, characterizes the state of the myocardium of the left ventricle and is equal to 100–120 mm Hg.

✓ diastolic (lower) blood pressure (DD) is the level of blood pressure at the moment of maximum relaxation of the heart, characterizes the degree of tone of the arterial walls and is equal to 50–80 mm Hg.

Blood pressure is measured in millimeters of mercury, abbreviated as mmHg. A blood pressure value of 120/80 means that the systolic pressure is 120 mmHg and the diastolic blood pressure is 80 mmHg. The difference between systolic and diastolic pressures is called pulse pressure (PP). It shows how much the systolic pressure exceeds the diastolic pressure, which is necessary for the aortic semilunar valve to open during systole. Normal pulse pressure is 35–55 mm Hg.

Only under such conditions, during the systole of the left ventricle, the valve opens completely, and blood enters the systemic circulation. If the systolic pressure becomes equal to the diastolic pressure, the movement of blood will be impossible and death will occur. An increase in pressure for every 10 mm Hg increases the risk of developing cardiovascular disease by 30%.

The amount of blood pressure depends on three main factors:

- frequency and strength of heart contractions;
- the value of peripheral resistance, i.e., the tone of the walls of blood vessels, mainly arterioles and venules;
- volume of circulating blood.

The blood pressure of a healthy person is a fairly constant value, but it always undergoes slight fluctuations depending on the phases of the heart and breathing. Blood loss leads to a decrease in blood pressure, and transfusion of large amounts of blood increases blood pressure. The amount of pressure depends on age. In children, blood pressure is lower than in adults, because the walls of blood vessels are more elastic.

### **Lesson progress:**

I. Organizational moment.

II. Actualization of basic knowledge and motivation of students' learning activities.

1. Students perform test tasks in order to check the assimilation of the material covered (by cards).

A) Answer the questions using the following terms: erythrocytes, thrombus, blood, fibrinogen, hemoglobin, antibodies, plasma, platelets, serum, donor, immunity, leukocytes, recipient:

1. What will remain if formed elements are removed from the blood?
2. What is the name of the soluble plasma protein?
3. What is formed during blood clotting?
4. What is the name of blood plasma without fibrinogen?
5. What are white nucleated cells called?
6. What protein makes blood red?



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